



AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT		1. CONTRACT ID CODE		PAGE 1 OF 3 PAGES	
2. AMENDMENT/MODIFICATION NO. 006		3. EFFECTIVE DATE See Block 16C		4. REQUISITION/PURCHASE REQ. NO.	
5. PROJECT NO. (If applicable)		6. ISSUED BY U.S. Department of Energy National Energy Technology Laboratory 3610 Collins Ferry Road Morgantown, WV 26507-0880		7. ADMINISTERED BY (If other than Item 6)	
CODE		CODE		CODE	
8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State, and ZIP Code) TBD		<input checked="" type="checkbox"/> 9A. AMENDMENT OF SOLICITATION NO. DE-PS26-01NT41048		<input checked="" type="checkbox"/> 9B. DATED (See Item 11) December 1, 2000	
		<input type="checkbox"/> 10A. MODIFICATION OF CONTRACT/ORDER			
CODE		FACILITY CODE		10B. DATED (See Item 13)	

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☒ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended, ☒ is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing Items 8 and 15, and returning 1 copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required) N/A

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS,
IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

<input checked="" type="checkbox"/>	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
	D. OTHER (Specify type of modification and authority)

E. IMPORTANT: Contractor ☐ is not, ☐ is required to sign this document and return copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

SEE PAGES 2-3 FOR DESCRIPTION

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)		16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print) James C. Knudsen Contracting Officer	
15B. CONTRACTOR/OFFEROR	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA	16C. DATE SIGNED
(Signature of person authorized to sign)		BY <u>Original Signed by James C. Knudsen</u> (Signature of Contracting Officer)	

The purpose of this amendment is to 1) update the availability of funding for some Areas of Interest, 2) revise the general terms and conditions, 3) revise Area of Interest 5, and 4) add two new Areas of Interest. The solicitation is amended as follows:

1. Provision 2.5, AVAILABILITY OF FUNDS (Aug 1999) is revised to update the Areas of Interest where there is currently no funds available. Provision 2.5 is deleted in its entirety and replaced with the following.

“2.5 AVAILABILITY OF FUNDS (AUG 1999)”

AREA OF INTEREST	ESTIMATED FUNDING PER AWARD ⁽¹⁾
2, 5, 14 and 17	No funds currently available ⁽²⁾
1, 3, 4, 6, 7, 8, 10, 11, 13, 15 and 18	\$100,000 to \$1 million
9	Up to \$2 million
12	\$100,000 to \$500,000
16	Several million (up to \$10 million)
19	Up to \$750,000

⁽¹⁾ All DOE funding is estimated and subject to availability

⁽²⁾ No funds are currently available for Fiscal Year 2001 awards. However, DOE will still receive pre-applications in these areas of interest to capture ideas that could be funded if funds become available.”

2. Provision 2.27, NOTICE TO UNSUCCESSFUL APPLICANTS (Aug 2000) is deleted in its entirety and replaced with the following:

“2.27 NOTICE TO APPLICANTS”

Each successful/unsuccessful applicant will be advised as timely as possible of the results of their pre-application/comprehensive application.”

3. Section VI, Attachment A, Area of Interest 5 is revised to incorporate two additional Research Objectives for this Solicitation. The revised Area of Interest is attached hereto. The new research objectives are in Redline text.

4. Section I, Technical Requirements and Section VI, Attachment A, is revised to add Area of Interest No. 18, entitled “Infrastructure Reliability for Natural Gas.” The text for Area of Interest 18 is attached hereto.
5. Section I, Technical Requirements and Section VI, Attachment A, is revised to add Area of Interest No. 19 entitled “Arctic Research in Drilling and Operations.” The text for Area of Interest 19 is attached hereto.
6. All other terms and conditions remain the same.

END OF AMENDMENT 006

SECTION I - TECHNICAL REQUIREMENTS

1.1 SUMMARY (JAN 2000)

The Department of Energy (DOE), National Energy Technology Laboratory (NETL), is conducting this solicitation to competitively seek cost-shared applications for research and development of technologies enabling development of energy resources needed to ensure the availability of affordable energy for the Nation's future.

This solicitation seeks applications for energy research and development related activities that promote the efficient and sound production and use of fossil fuels (coal, natural gas, and oil). Related information on the Fossil Energy Areas of Interest can be found on the "Technologies" page of the NETL website (www.netl.doe.gov) and on the "Program Areas" page of the National Petroleum Technology Office (NPTO) website (www.npto.doe.gov).

Through this solicitation, NETL expects to support applications in the following seventeen (17) separate (i.e., stand alone) Areas of Interest:

Coal & Environmental Systems:

- (1) Power Systems Advanced Research
- (2) Gasification Technologies
- (3) Combustion Systems
- (4) Carbon Sequestration
- (5) Environmental & Water Resources
- (6) Vision 21 Technologies

Fuel Processing

- (7) Natural Gas Processing
- (8) Transportation Fuels & Chemicals
- (9) Fuels Advanced Research

Oil Technologies

- (10) Ultrasonic Oil Well Stimulation
- (11) Reservoir Efficiency Processes
- (12) Oil & Gas Environmental
- (13) Critical Upstream Advanced Diagnostics and Imaging Technologies
- (14) Emerging Process Technology
- (19) Arctic Research in Drilling and Operations

Strategic Center for Natural Gas

- (15) Gas Exploration, Production & Storage
- (16) Advanced Turbines
- (17) Fuel Cells
- (18) Infrastructure Reliability for Natural Gas

Applicants must select and target only one (1) Area of Interest per application. Should the offeror propose different technologies/technical approaches for a single Area of Interest, a separate application must be submitted. Background information and objectives for each Area of Interest are detailed in Attachment A.

Area of Interest 5

Environmental & Water Resources

Background

The Environmental and Water Resources Product Line is responsible for the development of advanced environmental controls for emissions (air, water, and solids) from coal-based power systems. The program is also concerned with the use and disposition of coal combustion by-products (CCBs), as well as the potential impact of fossil-fuel production and utilization on watersheds. Further, the research being carried out provides high-quality scientific information on present and emerging environmental issues for use in regulatory and policy decision-making. Environmental considerations and the concomitant need for low-cost compliance options are the primary drivers of the current research program. The 1990 Clean Air Act has raised the bar relative to the environmental performance of coal-based power systems. Reductions in allowable emissions of sulfur dioxide (SO₂), nitrogen oxide (NO_x), particulate matter, acid gases, and mercury are being implemented or planned to deal with issues concerning ambient air quality (ground-level ozone, PM_{2.5}, air toxics), visibility impairment (PM_{2.5}, regional haze) and the health of terrestrial and aquatic ecosystems (mercury, acid rain, eutrofication). The potential impact of fossil-fuel production and utilization on surface and groundwater has also brought into sharp focus the need for high-quality information and technology related to future regulatory requirements. To address these numerous environmental challenges, NETL is carrying out a well-focused, highly leveraged research program in the areas of fine particulate matter (PM_{2.5}), NO_x, mercury/air toxics, acid gases, CCBs, and water. The success of the program is intimately tied to key collaborations and partnerships established with industry, Federal, state, and local agencies, and the academic and research communities.

Overall Program Goals

- Develop database on the relationship between ambient air quality and emissions from fossil-fuel-based power production.
- Develop technology by 2003 for controlling NO_x emissions to a level < 0.15 lbs/million Btu at three quarters the cost of selective catalytic reduction.
- Develop technology by 2005 for reducing mercury emissions by 50-70 percent at less than one half current costs.
- Develop technology by 2003 capable of achieving > 99.99 percent capture of ultra-fine primary particulate matter.
 - Develop technology for achieving > 90 percent acid gas emissions reduction by 2003.
 - Develop new applications for CCB materials and provide data on their environmental acceptability.

Research Objectives for This Solicitation

- Evaluate the impact of the control of mercury and other hazardous air pollutant (e.g., arsenic) on the disposal and/or utilization of CCBs and related water-quality issues.
- Develop a comprehensive, computer-based system for (1) integrating the ambient air quality data being collected under multiple ongoing DOE-sponsored monitoring programs in the Pittsburgh, PA region, and (2) creating a publically-available, user-friendly tool for accessing, displaying, analyzing, and interpreting these air quality data.
- Quantitatively evaluate: (1) how the nationwide disposal and utilization of CCBs would be affected by the lowering of RCRA leachate standards for specific hazardous constituents (e.g., mercury, arsenic); and (2) how these CCB impacts would affect the overall economic competitiveness of the coal-fired electric power industry.

Area of Interest 18

Infrastructure Reliability for Natural Gas

Background

There are about 1.3 million miles of natural gas transmission and distribution pipelines serving over 175 million customers in the United States. Maintaining the integrity and reliability of the natural gas distribution and transmission systems across the United States is essential to ensure the availability of clean, affordable energy for our homes, businesses and industries. A number of factors, including an aging natural gas infrastructure, increased energy demand, utility deregulation and restructuring, and intense competition requires additional technology development to ensure the continued high level of integrity and reliability of the natural gas infrastructure.

The National Energy Technology Laboratory, through the Strategic Center for Natural Gas, recently sponsored visioning and roadmapping sessions with a variety of technical experts to identify and prioritize technology needs for the natural gas infrastructure. The results from these sessions are summarized in a final report entitled “Pathways for Enhanced Integrity, Reliability and Deliverability”, located at <http://www.netl.doe.gov/scng/publications/naturalg.pdf>. Applicants are encouraged to review the information contained in this document; however, this is not required to prepare and submit proposals under this solicitation.

Overall Program Goals

The goal of the National Gas Infrastructure Reliability program is to encourage and promote innovative research and development efforts resulting in the development of advanced technologies or methodologies which will maintain and enhance the integrity and reliability of the Nation’s natural gas transmission and distribution network.

Research Objectives for this Solicitation

- Develop technologies to detect or alleviate third party damage. This includes, but is not limited to, the development of sensors, pipeline materials, remote observation platforms, and communication techniques to detect infringements, and ultimately potential infringements, on the natural gas transmission and distribution pipelines;
- Develop technologies which allow location and/or detection of subsurface facilities including, but not limited to, non-metallic pipes;
- Develop and demonstrate improved guided boring technologies that reduce position uncertainty, enhance maneuverability and improve operational efficiency;
- Develop sensors for guided boring tools that allow them to detect or avoid underground facilities;
- Develop improved, cost effective technologies for the remote detection of pipeline leaks;

- Develop and demonstrate improved, cost effective monitors and sensors for use in the natural gas infrastructure;
- Develop and/or evaluate new, cost effective materials for use in the natural gas infrastructure;
- Develop virtual models for gas system reliability analyses;
- Develop improved NDE technologies or tools (keyhole technologies) to evaluate pipeline integrity and repair damaged pipe while minimizing excavation, for both inspection and repair, with an emphasis on distribution and small diameter transmission pipelines;
- Develop improved, cost effective automated data acquisition, system monitoring and control techniques between the field and control centers.

Area of Interest 19

Arctic Research in Drilling and Operations

Background

The Advanced Drilling, Completion, Stimulation, and Operations Program (ADCS) as part of Fossil Energy's Oil and Gas Program is driven by the needs of the domestic industry for effective and environmentally sound technology. The program supports fundamental and applied research directed toward producing innovative technologies to increase well production, with Federal support, to assure that appropriate maximum oil production potential is reached in the nation's wells while maximizing environmental protection on the surface and in the subsurface. In this solicitation, the program looks for proposals suitable to meet the challenges of producing oil and gas in arctic conditions.

In 2000, NETL initiated actions with an emphasis on technologies suitable for drilling and operations targeted to production in the nation's oil and gas wells located in arctic conditions. Producers are working with special conditions and clearly, breakthrough technologies will extend the life of fields in the arctic as well as increase the ultimate production from these fields where the technology will be applied. The challenge is to take basic scientific principles and apply them to the challenges specific to that environment in an effort to maximize production from individual wells.

The R&D emphasis through this effort is to develop cost-effective and environmentally acceptable ADCS-related process or technologies for arctic conditions. An objective is to assist the industry with breakthrough technology to maintain the U.S. technological lead in developing new tools and processes for use in harsh or environmentally sensitive arctic areas.

Program Goals

- To develop and test breakthrough technologies specifically targeted to the problems of finding and producing oil and natural gas in the Arctic regions of the world.
- Focus on technologies that ensure operations can be conducted with a minimal impact on the environment or improve current operations significantly.

Research Objectives for this Solicitation

Research and Development and Demonstration of ADCS Technology for Arctic Conditions.

The program is looking for proposals that would provide advancements in directional drilling techniques that would reduce surface disturbance, reduce greenhouse gas emissions from North Slope drilling, or develop heavy oil reserves, or develop Alaska's extremely low-sulfur coal reserves and

shallow gas fields. This includes, but is not limited to, carbon sequestration, heavy oil recovery, and directional drilling technologies.

- Work with industry organizations, government regulators, and other interested parties to generate, test and transfer to the industry users new technologies that meet the rigid requirements of use in the arctic.
- Reduce costs to the operator while increasing production with ADCS technology suitable for the arctic conditions.
- Preparation of suitable technology transfer efforts that will accelerate the adoption of improved technology in exploration or development activities.